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University of Gondar

(3) E.C.T

College of Natural and Computational Sciences

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Department of Mathematics

A–E

Basic Mathematics for Natural Sciences (Math1011N)

Mid Examination

Name: _____ Max. Marks: 30%

ID.No. _____ Time Allowed: 1½hours

Section: _____ Date of Exam: 17 December, 2025

Instructions

- Attempt all of the questions as per instructions given their in.
- Make sure that this exam booklet consists of four parts each consisting of 5, 6, 6, and 2 questions respectively.

$A\Delta\phi = A$

$A\Delta\phi - A\cap\phi$

Part I. Write True if the Statement is Correct and write False if the statement is Incorrect. 1 pt. each

1. The truth value of $(\forall x \in \mathbb{R})(\exists y \in \mathbb{R})(xy = 3)$ is true. _____
2. For any set A, $A\Delta\emptyset = A$. _____
3. For any sets A and B, $n(A) = n(B) \Rightarrow A - B = \emptyset$. _____
4. The number of nonempty subsets of a finite set E is $2^{n(E)}$, where $n(E)$ is the number of elements of set E. _____
5. The converse of the statement "The wages are low if there are price controllers" is "There are the price controllers if the wages are low." _____

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1. Which one of the following is an open proposition .

   A. $x+1=x$ B. $x+1=0$ C. $x+1<x$ D. All

2. If p, q, and r denote the propositions, then which of the following is equivalent to $p \Longrightarrow (p \vee r)$?

   A. $\neg q \Longrightarrow (\neg p \vee r)$
   B. $\neg q \Longrightarrow (r \vee p)$
   C. $q \Longrightarrow (r \vee p)$
   D. $(q \vee r) \Longrightarrow p$

3. Which of the following is NOT a proposition?

   A. 3 is an even number.
   B. It is a country in Africa.
   C. 27 is a prime number.
   D. Albert Einstein was born on 29 July 1890.

4. Let p, q, r, and s have truth values T, F, T, and F respectively. Then the truth value of $(\neg(p \wedge q) \Longleftrightarrow (p \vee \neg r)) \Longleftrightarrow s$ is

   A. True B. False C. None

5. Let $A \subseteq B$ and $A \subseteq C$. Suppose $a \in A$, $b \in B$, $c \in C$, then which of the following propositions must be true?

   A. $c \in A$ B. $b \in A$ C. $a \in C$ D. $c \in B$

6. If A is any set and $P(A)$ is the power set of A, then which of the following is NOT necessarily true?

   A. $\varnothing \in P(A)$
   B. $\varnothing \subseteq P(A)$
   C. $A \in P(A)$
   D. $n[P(A)] > 1$

7. If $T * F \equiv F$, the logical connector " $*$ " is

   A. $\Longrightarrow$ B. $\wedge$ C. $\Longleftrightarrow$ D. All

8. If $A \triangle B = \{-1, 0, 1, 3, 4\}$ and $A - B = \{0, 3\}$, then which one of the following is NOT true?

   A. $B - A = \{-1, 1, 4\}$
   B. $(A \cap B) \subseteq P(A \cap B)$
   C. $n(B) \geq 3$
   D. $n(A) \geq 2$

Part III. Fill in the Blank Space With the Most Simplified Answer.

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1.5 pts. each

1. The truth value of $(\exists x \in R, \forall y \in R)(xy = y)$ is _____.
2. Let $U = \{-1, 0, 2, \sqrt{3}, 2.1\}$ be the universal set. Then the truth value of $(\forall x \in U)(\exists y \in U)(x^2 + y^2 = 4)$ is _____.
3. List down the elements of $B = \{x : x \in \mathbb{Z}, x \leq -3 \Longrightarrow x^2 = 9\}$ _____.
4. Let A and B be two sets such that $A \supseteq B$, then $(A - B) \cup B =$ _____
5. Let A and B be subsets of the universal set U and if $A \cap B = \emptyset$, then $A^c - B^c =$ _____
6. Let $A = \{-1, \{0\}, 1\}$. Then $A - \{0\} =$ _____.

Part IV. Workout (Show all the Necessary Steps Clearly and Neatly.)

2 pts. each

1. Investigate whether the arguments $p \Longrightarrow q, q \Rightarrow r, \neg r \Rightarrow p$ is valid or not using rule of inference.
2. In a group of 50 students, 26 take economics while 12 take both economics and psychology. If there are 10 students who take neither economics nor psychology, how many students in the group take only psychology?


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